



GPS Status and Modernization

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Overview

- GPS Overview
- Recent Events
- Modernization Improvements





Critical Asset

- Vital to International Security, Economic Growth, and Public Safety
- Extends across all domains -- air, land, sea, space, cyberspace
- Effects transcend national and military boundaries



Available, reliable, accurate, and free of charge



GPS – Serving the World

- Very robust constellation
 - 30 satellites currently in operation
 - 10 GPS IIA
 - 12 GPS IIR
 - 7 GPS IIR-M
 - 1 GPS IIF
 - 4 additional satellites in residual status
 - 1 additional IIR-M waiting to be set healthy
- Global GPS civil service performance commitment met continuously since December 1993
- Next Launch – IIF-2, 14 Jul 2011





GPS Control Segment



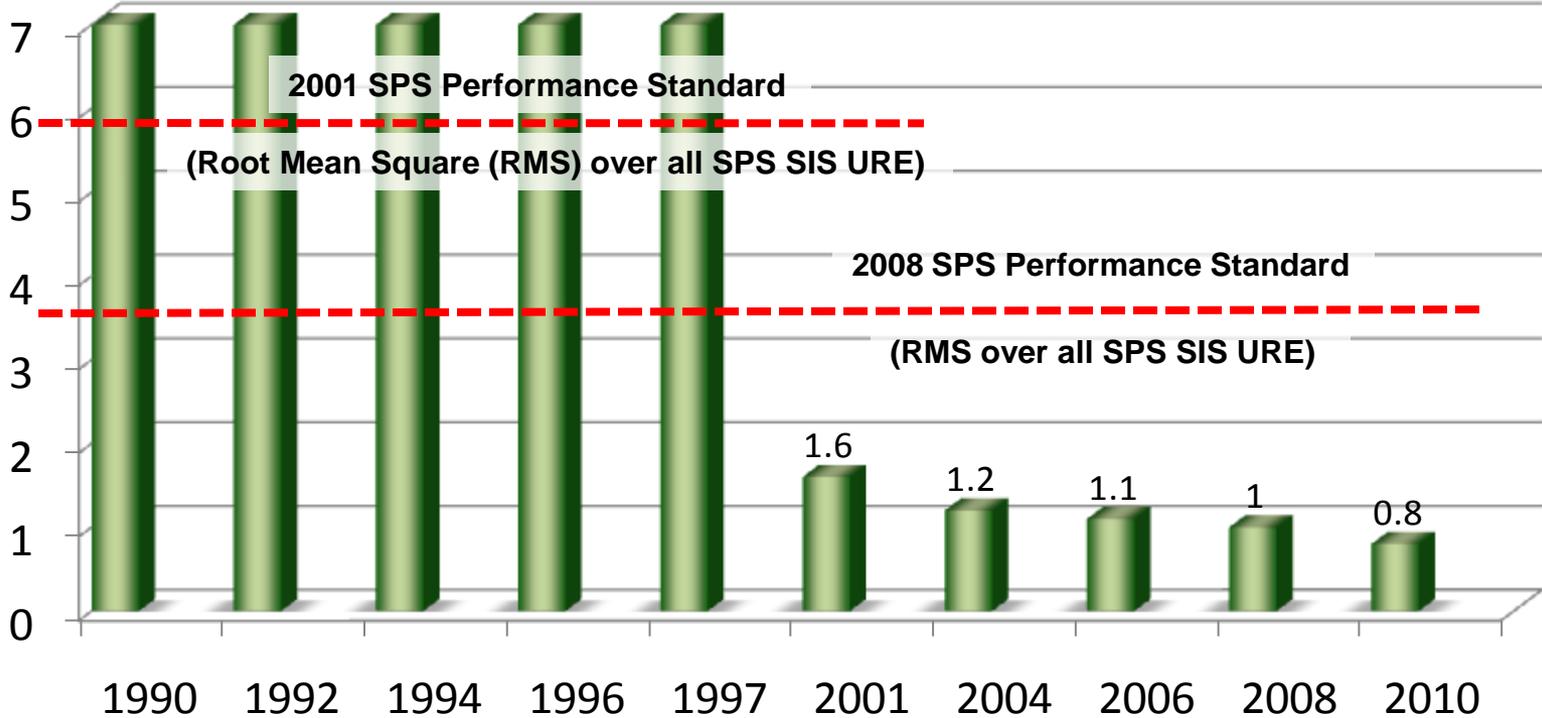
- Operated by Space Professionals in 2d Space Operations Squadron at Schriever AFB, CO
- Backup facility at Vandenberg AFB, CA
- Global monitoring and antenna networks





SPS Signal in Space Performance

RMS Signal-in-Space User Range Error (URE), meters



Selective Availability

System accuracy exceeds published standard



GPS Modernization – Space and Control Segments

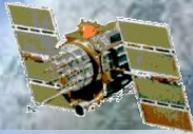
1995

2005

2010

2014 - 2025

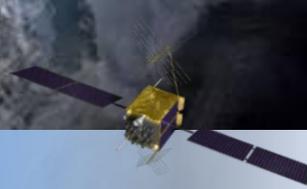
GPS IIA



**Space
Segment**

- Standard Service
- Single frequency (L1)
- Coarse acquisition code navigation
- Precise Service
 - Y-Code (L1Y & L2Y)

GPS II R / IIR-M



- IIA/IIR capabilities plus
- 2nd civil signal (L2C)
- M-Code (L1M & L2M)

GPS IIF



- IIR-M capability plus
- 3rd civil signal (L5)
- 12 year design life

GPS III



- Backward compatible
- 4th civil signal (L1C)
- Increased accuracy
- Increased integrity
- **Increased AJ**

Control Segment

**Legacy
Control
System**

**Architecture
Evolution Plan
(AEP)**

**Next Generation
Control Segment
(OCX)**



GPS Modernization – Ground

- Architecture Evolution Plan (AEP)
 - Transitioned in 2007
 - Modern distributed system replaced 1970's mainframes
 - Increased capacity for monitoring of GPS signals
 - Increased worldwide commanding capability
 - January 2011—Version 5.6 operational enables SAASM features
- Next Generation Control Segment (OCX)
 - Controls more capable GPS constellation
 - Monitors all GPS signals
 - \$1.5B contract awarded 25 February 2010
 - Preliminary Design Review—20-24 June 2011



GPS Modernization – New L2C Civil Signal

- Second civil signal “L2C”
 - Designed to meet commercial needs
 - Higher accuracy through ionospheric **signal distortion** correction
 - 1st launch: Sep 2005 (GPS IIR-M); 24 satellites: ~2016
 - Codeless message currently broadcast from 7 IIR-Ms and 1 IIF
 - OCX Block 1 (2015)
 - Provides command, control, and monitoring of L2C
 - Enables new civil navigation message (CNAV)



GPS Modernization – New L5 and L1C Civil Signals

- Third civil signal “L5”
 - Designed to meet demanding requirements for transportation safety-of-life
 - 1st launch: 27 May 2010 (GPS IIF); 24 satellites: ~2018
 - Codeless message currently broadcast from first IIF
 - OCX Block 2 (2016) provides command, control, and monitoring of L5
- Fourth civil signal “L1C”
 - Designed with international partners for GNSS interoperability
 - Begins with GPS Block III
 - 1st launch: ~2014; 24 satellites: ~2021
 - OCX Block 2 (2016) provides command, control, and monitoring of L1C



GPS Expandable

- Optimizes GPS assets to improve operational effectiveness for global users & terrain challenged environments
 - Increased number of vehicles overhead for better availability/coverage
 - Constellation expansion feasible with robust number of satellites now on-orbit
- Consistent with the current Standard Positioning Service (SPS) Performance Standard
 - Adjusted position of satellites in 3 of 6 orbital planes to create expanded constellation
 - Expanded constellation provides better GLOBAL coverage
- Reconfiguration complete on 11 June 2011



Summary

- Largest constellation in history with best accuracy ever
- Modernized Command and Control System allows more signal monitoring and quicker satellite commanding than ever before
- Constant improvements through constellation management
- And we're continuing to modernize and improve GPS even more!

GPS -- Serving the World